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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/639,917	08/16/2000	Joseph M. Brand	108298530US	4048

25096 7590 09/12/2002

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EXAMINER

MITCHELL, JAMES M

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 09/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/639,917

Applicant(s)

BRAND, JOSEPH M.

Examiner

James Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) 37-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 4.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election

1. Applicant's election without traverse of Group 1 Claims 1-36 in Paper No. 4 is acknowledged.

Claim Rejections - 35 USC § 102

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).
3. Claim 1,2,4-6, 10, 12 13, 14, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Hembree (U.S 6,432,840).
4. Hembree discloses (Fig 4A-4F; Column 7-8, Lines 43-17) a method for packaging an inherent microelectronic substrate (die formed on a substrate, 12) that includes a memory chip (Column 2, Lines 40-41), comprising disposing an encapsulant (38A,B) adjacent to a surface of the microelectronic substrate, and exposing at least a portion of the surface of the microelectronic substrate by removing a portion of the encapsulating material (Fig 4C) adjacent to the surface of the microelectronic substrate with the microelectronic substrate inherently in an operable condition after the portion of the encapsulating material is removed; said microelectronic substrate has a first

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(bottom) and second (top) surface facing opposite said first surface with the first surface having a plurality of bond sites for electrical connection (via bond sites of ball, 56) to the microelectronic substrate, and further wherein exposing a portion of a surface of the microelectronic substrate includes exposing a portion of the second surface of the microelectronic substrate; and mounting the microelectronic substrate to a printed circuit board (Column 2, Line 41); convectively transferring heat (30) directly away from the exposed portion of the surface of the microelectronic substrate; by forming a heat transfer structure in an external surface of the encapsulating material (FIG 4F; external portion, understood to mean, an edge of the encapsulant) in contact with heat structure; and manipulating at least a portion of the encapsulating material includes removing a portion of the encapsulating material adjacent to the second surface of the microelectronic substrate (Fig 4F); to expose a portion of a surface of the microelectronic substrate initially covered by the encapsulating material; said heat structure includes a rib projecting away from the microelectronic substrate.

5. Claims 17, 19-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Glenn (U.S 6,424,031).

6. Glenn (Fig 3,5B) discloses a method for packaging a microelectronic substrate (302) by inherently positioning at least one of an encapsulating material (300) and a support member (348) adjacent to the microelectronic substrate, and processing at least one of the encapsulating material and the support member to have an interlocking feature (334-1) by manipulating a portion of the encapsulating material; wherein the interlocking feature further comprises forming a second interlocking feature in a second

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surface of the encapsulating material facing opposite the first surface; the encapsulating material includes forming a recess (Fig 2) and the encapsulating material includes forming a projection in the encapsulating material extending away from the microelectronic substrate; said microelectronic substrate is electrically coupled (via 314) to support member trace (350) to form an a second interlocking feature configured to engage the first interconnecting feature; wherein the package comprises aligning a first microelectronic device package (bottom package) having a first microelectronic substrate and a first encapsulant with a second microelectronic package having a second microelectronic substrate (top) and a second encapsulant engaging a first interlocking tab (332) feature of the first package with a second recess (334) interlocking feature of the second package to restrict relative motion between the first and second packages (Fig 2); and the first microelectronic substrate has a support member (348) has a cavity (defined by region between tab) wherein the second microelectronic substrate is in the cavity (via formed on first package that is in cavity), electrically coupling the microelectronic substrate to a support member (via 330) having a first surface and second surface facing opposite to one another, the first surface having a conductive Inherent pad (area of trace in contact with lead, 312), positioning the support member and the microelectronic substrate between two portions of a mold (Column 2, Lines 57-65) with the first surface and the bond pad of the support member inherently facing the first cavity (bottom mold) in the first portion of the mold and the microelectronic substrate facing a second cavity in the second portion of the mold (Top mold).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hembree.

10. Hembree discloses the elements stated in paragraph 4 and further discloses a heat structure that includes rods projecting away from the microelectronic substrate, but does not appear to explicitly show that the rods are cylindrical.

11. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected

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result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

12. Claims 3, 7, 8, 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hembree as applied to claims 1 and 10 and further in combination with Khandros et al. (U.S 6,433,419).

13. Hembree further discloses mounting said microelectronic substrate to a support member (20) with a first surface of said microelectronic substrate facing the support member and a second surface of the microelectronic substrate facing away from the support member, electrically coupling the microelectronic substrate to the support member (via electrical connection formed among balls, 56), disposing the encapsulant material (28,38A, 38B) adjacent to both the microelectronic substrate and the support member.

14. Hembree does not appear to disclose exposing at least a portion of the second surface of the microelectronic substrate by directing laser radiation toward the portion of the encapsulating material adjacent to the second surface to ablate the portion of the

encapsulating material, but Khandros utilizes light radiation that inherently sequentially exposes layers of encapsulating material.

15. It would have been obvious to one of ordinary skill in the art to incorporate exposing the adjacent encapsulant of Hembree to light, in order to remove encapsulant as taught by Khandros (Column 6, Lines 12-15).

16. In regards to claim 8, the prior art discloses the claimed invention except for removing a portion of encapsulant by directing a laser beam having a power of from 4 watts to about 25 watts toward the encapsulating material. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize laser beam having a power of from 4 watts to about 25 watts, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CPA 1955).

17. Claims 18, 28, 29, 30, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn in combination with Khandros.

18. Glenn discloses the elements in paragraph 6, but does not appear to disclose manipulating a portion of the encapsulating material includes directing laser radiation toward the encapsulating material. Khandros utilizes directing laser radiation toward the encapsulating material

19. It would have been obvious to one of ordinary skill in the art to incorporate exposing the encapsulant of Glenn to light, in order to remove encapsulant as taught by Khandros (Column 6, Lines 12-15)

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20. In regards to claim 29, see paragraph 16.

21. In regard to claim 31, examiner takes official notice that it would have been obvious to one of ordinary skill in the art to form solder balls to the bond pad of Glenn at the time the invention was made in order to provide an alternate means for electrical connection and decrease in size.

22. Claims 32 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn and Khandros in combination with Lin (U.S 6,093,969).

23. Glen and Khandros disclose the elements stated in paragraphs 18 and 19, but do not appear to disclose electrically coupling the microelectronic substrate to the support member by passing wire through an aperture in the support member and connecting one end each wire bond to the support member and an opposite end of each wire bond to the microelectronic substrate.

24. It would have been obvious to one of ordinary skill in the art to incorporate to the modified structure of Glen and Khandros, electrically coupling the microelectronic substrate to the support member by passing wire through an aperture in the support member and connecting one end each wire bond to the support member and an opposite end of each wire bond to the microelectronic substrate in order to provide increased density as taught by Lin (Column 1, Line 10).

25. In regards to claims 34 and 35 see paragraph 29.

26. In regards to claims 36, the prior art does not appear to disclose removing a portion of the encapsulating material wherein the thickness of the portion is greater than about 0.003 inch, see paragraph 11.

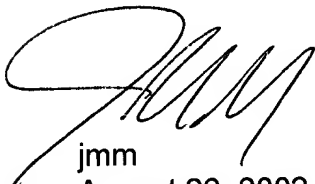
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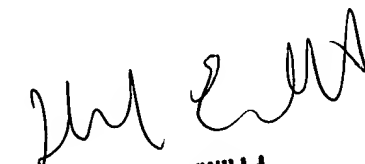
Conclusion

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3230 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


jmm
August 26, 2002


DAVID E. GRAYBILL
PRIMARY EXAMINER

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DETAILED ACTION

Election/Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-36, drawn to a method of making a semiconductor device, classified in class 438, subclass 112.
 - II. Claims 37-63, drawn to a semiconductor device, classified in class 257, subclass 787+.
2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process, ie a process which does not require that the encapsulating material be adjacent to a surface of the microelectronic substrate, or an interlocking feature, or a heat transfer structure, or laser irradiation.
3. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

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4. During a telephone conversation with John Wechkin on 8/8/02 a provisional election was made without traverse to prosecute the invention of group I, method claims 1-36. Affirmation of this election must be made by applicant in replying to this Office action. Claims 37-63 have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.